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(54) **Bag for bulk material**

(57) A bag for bulk material has two opposed side walls (1), two intermediary fold-forming walls (2) and a bottom wall (3). The side walls (1) have at their upper ends carrying loops (5) and b - tween which is a two-part top wall (6) with at least one filling mouth (8). The carrying loops (5) are formed by each of the side walls (1) being extended above the top wall (6), folded down upon themselves and attached in an attachment zone (30) to themselves and to the top wall (6). Along a substantial part of the side wall joint (4), preferably at the outer ends (7) of the attachment zon s (30) and at the edges of the carrying straps (5) there are reinforcing strips (29) which are preferably extensions of the walls, e.g. the fold-forming walls (2), and are attached in or to the side wall joints (4).

Fig.1

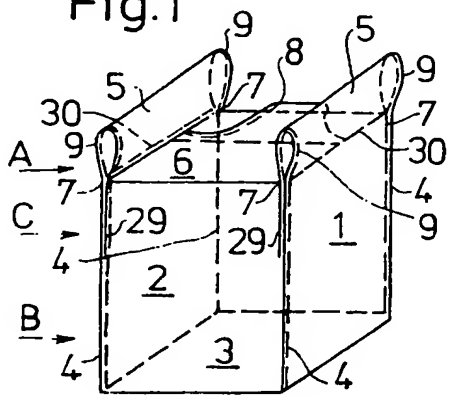

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Fig. 2

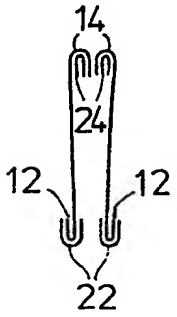
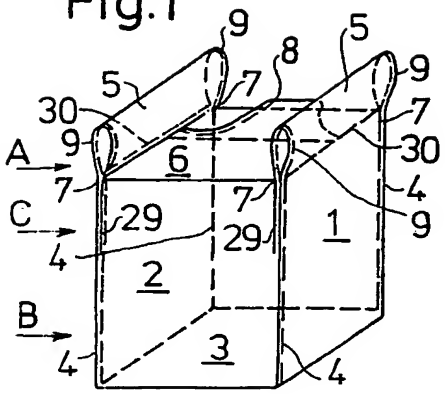


Fig. 1



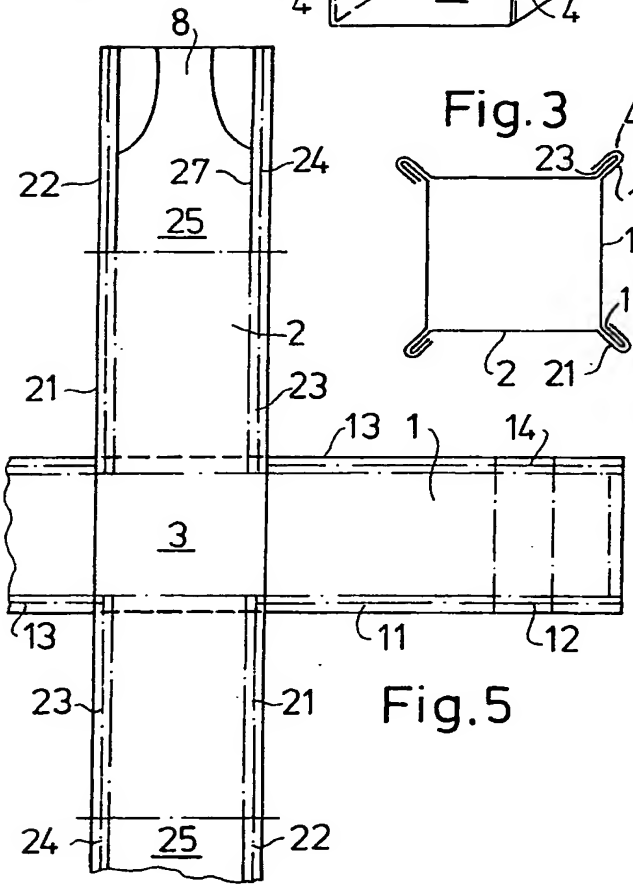


Fig. 3

Fig. 4

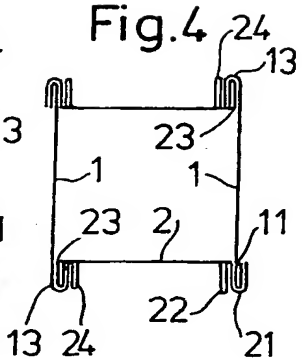
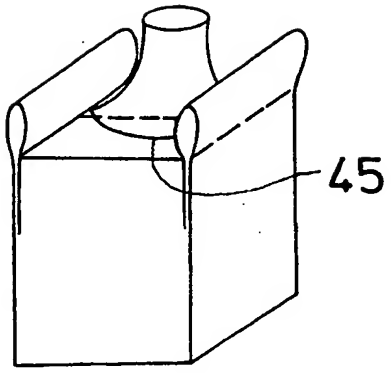


Fig. 5

Fig.6



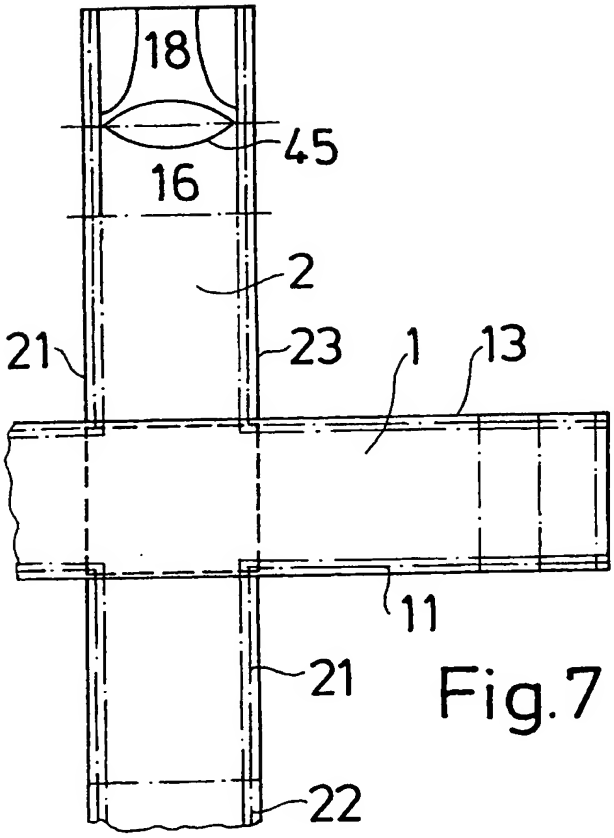


Fig.7

SPECIFICATION

Bag for bulk material

The invention relates to a bag for bulk material, such as pulverulent or granular material and of the kind comprising a bottom wall, two opposed side walls, two opposed fold-forming walls between and connected by means of side wall joints to the side walls in such manner that when the bag is filled the side and fold-forming walls form a tube with a substantially rectangular cross section, carrying loops at the upper ends of the side walls, and a top wall provided with at least one filling mouth between the carrying loops.

Such bags are provided with carrying loops so that the bag can be moved mechanically, for example by means of a fork truck the prongs of which may be introduced into the loops. These bags have the weakness, however, that sometimes they disintegrate at the ends of the joints between the carrying loops and the side walls because, in the case of a heavily filled bag, the bag material will be subject to heavy tensile forces at these points.

It is the object of the invention to provide a bag of the aforesaid kind which is easy to flatten, fill and empty, is easy to handle and cheap to manufacture and which is more robust than the known bags, in particular near the carrying loops.

An essential feature of the bag according to the invention is that the carrying loops are formed by each of the side walls being extended above the top wall folded down upon itself and attached to itself at an attachment zone; and reinforcing strips extend down along and are attached in or to the side wall joints.

The tube will conveniently be of substantially square cross section.

The reinforcing strips may also extend along the edges of the carrying loops, and preferably extend down along the side wall joints as far as the bottom wall.

The reinforcing strips may be wholly or partly constituted by separate strips. More simply however, the reinforcing strips are integral extensions of the side and/or fold-forming walls.

The top wall is preferably provided in two parts connected to respective ones of the fold-forming walls.

For added strength, the folded down portion of each side wall is also attached, at the attachment zone, to an adjacent edge of the top wall.

In these ways, an appreciable reinforcement of the bag is obtained since the force to be transmitted from the carrying loops to the bag proper pass along reinforced edges of the carrying loops and further down along the reinforced joints between the walls of the bag. This is particularly so if the filled bag, during handling, should happen to adopt a slightly unev n position on the fork of the truck. The emtpy bag is furthermore easy t flatten since the reinforcing portions are located at points where they do not prevent the flattening.

The reinforcing portions of the bag may advantageously be formed when the two fold-forming walls are extended upwardly and these extensions are each divided into edge strip portions and a central section, the central sections being folded down and attached along their edges to the attachment zones of the side walls so as to form two top wall halves, whereas the edge strip portions constitute the reinforcing strips. As a result, the forces to be transmitted from the carrying loops may act in the same material and along the same material fibres an appreciable way down along the reinforced side wall joints.

The filling mouth may advantageously be formed by the outer corners of extensions of the two top wall halves being cut out concavely and the middle concave extensions of the top wall halves being joined along the curved edges. As a result, the filling mouth will have a suitable form so that it may constitute a uniform transition between the bag and a connecting tube.

For certain uses it may be of advantage to cut or otherwise provide a separate filling mouth which is attached around an aperture in the top wall and which, for example, may be attached in such a manner that it constitutes an upright valve.

The joints between the walls may conveniently b sewn or welded, but the nature of the joint must naturally be adapted to the material used.

In a suitable construction, the side walls and the fold-forming walls are constituted by two crossed webs of material which together provide a double-ply bottom wall of the bag, the lower ply of the bottom wall forming a bottom strap and the carrying loops being formed of the same web of material as the bottom strap. The carrying forces to be transmitted from the carrying loops to the bag proper may thus pass through, and be distributed in one and th same web of material, without having to pass a transverse joint that might be a weak point.

When a bag is to be emptied, for example by being suspended by its bottom strap, the top wall with the filling valve will be subjected to a load as a "bottom". It will then be advantageous if the side walls and the fold-forming walls are constituted by two crossed webs of material which together provide a double-ply bottom wall of the bag, the lower ply of the bottom wall forming a bottom strap and the fold-forming walls and the top wall being form d of the same web of material as the bottom strap. The forces may then act in the web without the joints being subjected to a load exceeding that which is absolutely necessary.

The bag may advantageously be manufactured of a two-layer plastics foil, one layer being woven while the other layer is constituted by a thin, smooth, dense foil. The plastics foil may be cut in such a manner that the woven fibres extend parallel with, respectively, and transversely to the edges of the bag. The carrying forces may thus act parallel to the fibres. The inside of the bag should be smooth so that the bulk material may readily be released from the bag and slide out through the filling mouth.

The bag may be manufactured in a suitable manner with a saving of material by the use of two cut out webs of material, of which one of the webs of material forms in series a filling mouth half, a top

wall half, a fold-forming wall, a bottom wall ply, a fold-forming wall, a top wall half and a filling mouth half, the web having concurrently with the top wall halves and the filling mouth halves edge strip for reinforcing the joints of the bag, while the other web of material forms in series a carrying loop, a side wall, a bottom wall ply, a side wall and a carrying loop. A bag with separate filling mouth may be manufactured in the same manner, the parts for the separate filling valve being positioned at the ends of the one web.

The invention will now be described with reference to the accompanying drawings, in which:-

Figure 1 is a perspective diagrammatic view of one example of bag constructed in accordance with the invention in its filled condition;

Figure 2 a horizontal section through one of the loops of the bag at the arrow A in Figure 1, the size of the joints being exaggerated;

Figure 3 a horizontal section near the bottom of the bag at the arrow B in Figure 1, the size of the joints being exaggerated;

Figure 4 a horizontal section taken slightly below the top wall of the bag at the arrow C in Figure 1, the size of the joints being exaggerated;

Figure 5 shows an unfolding of the webs of material of the bag illustrated in Figure 1;

Figure 6 is a perspective view of another example of bag according to the invention; and,

Figure 7 shows an unfolding of the webs of material of the bag shown in Figure 6.

The bag shown in Figure 1 is formed from two crossed webs of material as indicated in Figure 5. The bag has two side walls 1 which are extended upwardly to form carrying loops 5 to enable the bag to be moved by a fork truck or handled mechanically in other manner. Between the side walls 1 are two fold-forming walls 2 which are likewise extended upwardly so as to form a two-part top wall 6 and a filling mouth 8. The latter may be connected to a tube when the bag is to be filled or emptied. The filling mouth is formed with concave sides to provide a better distribution of the bulk material in the bag during filling and to enable the filling mouth to act as an outlet during discharge.

Between the side walls and folding walls are side wall joints 4, each including parts from two walls. As shown in Figure 3 all the joints are formed by folding over both walls and by sewed joining of the four layers of material formed by the folding, viz. 21,11,11,21 or 13,23,23,13. For the sake of clarity the joints shown in the Figure are very enlarged in proportion to the remaining portion of the bag. The joints may also be formed by welding.

As shown in Figure 5 the material constituting the fold-forming walls is divided at each end into a central section 25 and two edge strip reinforcing portions 22,24. As shown in Figure 1, the central sections, which form the divided top wall 6, are bent through about 90° in relation to the walls 2 and along their edges 27 they are attached to the upper edges of the side walls in two attachment zones 30. Each central section 25 is preferably slightly more than half the length of the total top wall 6. At the attachment of the individual central section 25, i.e. the top wall half to the side walls 1, th re must b a surplus of material from the central section, preferably in a pleat, at the corners 7 where the walls adjoin. This means that, at the sewing op ration in which the top wall 6 and the side wall 1 are joined, the material of the top wall is fastened against th material of the side wall at the corner 7. This will ensure that the forces to be transmitted from the carrying loops of the bag to the bag proper will pass substantially through the reinforced side wall seams and only to a lesser extent through the fold-forming wall. The edge strip portions 22,24 may exclusively be sewn up with the side wall seams, but the edge strip portions 22, 24 may further be sewn up with the edges of the carrying straps 5 directly in extension of the side wall seams 4, by which the strap edges are reinforced. The strap edges may be formed by sewing through four layers of fabric or plastics similarly to the side wall joints.

Because of the filling mouth 8 the web of material used for the fold-forming walls, top wall and filling mouth is somewhat longer than the web used for the side walls and the carrying loops, see Figure 5. After the walls 1,2, the carrying loops 5 and the edge strip portions 22, 24 have been joined by sewing, a part 29 of the portions 22, 24 will extend beyond the seam 9 in the edge of the carrying loop 5. The part 29 extends normally a substantial distance down along the seam 4 and is sewn to the seam as shown in Figure 1 and thereby reinforces the carrying capacity of the loop and the bag to an appreciable extent. The part 29 may, however, extend as far as down to the bottom of the bag. If the part 29 is of insufficient length, it may be extended by means of extra reinforcing strips (not shown, however) so as to reach the bottom of the bag.

Such portions 41 and 42 of the material (see Figure 5) as are normally cut off by the cutting of the concave filling mouth 8 may be used for further reinforcement of the reinforcing portions 22, 24.

Figures 5 and 7 show webs of material cut in a special material saving manner. As will be seen, carrying loops, side walls and bottom wall are constituted by one and the same piece so that the carrying forces to be transmitted from the carrying straps may be distributed in one and the same web without passing through any transverse seams that might impair the design. By means of the crossed webs of material the bag will further be provided with a double-ply bottom wall 3, in which the lower ply of the bottom wall may be used as a bottom strap, which is of particular advantage when the bag is to be emptied.

In the bag shown in Figure 6 the filling mouth is a separate unit attached around an aperture 45 in the top wall 6. As a result, the filling mouth will be upright, that is, without tendency to lay down along the top wall 6. The filling mouth will then always be open and thus give easier access to the interior of the bag. Such a separate mouth 18 may, however, also be incorporated in a web of material as shown in Figure 7, the mouth 18 being separated wholly or partly from the top wall half 16 by an oval cutting 45. The edge strip portions 22,24 of the web are also in this case used for reinforcing both the side seams 4

and the loop edges 9 or only the side seams 4.

The bag is preferably made of a two-layer plastics foil, one of which, the outer layer, being woven, whereas the other inner layer is constituted by a thin, dense, smooth foil.

The outer woven layer, in which the fibres preferably extend parallel, and at right angles, to respectively, the edges of the bag, reinforces the bag, whereas the inner, smooth layer facilitates filling and, in particular, emptying of the bag since the bulk material is more readily released form a smooth, inner surface of the bag.

The bag may be manufactured in other forms of plastics or fabric or similar flexible materials.

CLAIMS

1. A bag for bulk material such as pulverulent or granular material, and comprising a bottom wall, two opposed side walls, two opposed fold-forming walls between and connected by means of side wall joints to the side walls in such manner that when the bag is filled the side and fold-forming walls form a tube with a substantially rectangular cross section, carrying loops at the upper ends of the side walls, and a top wall provided with at least one filling mouth between the carrying loops, characterised in that the carrying loops are formed by each of the side walls being extended above the top wall folded down upon itself and attached to itself at an attachment zone; and reinforcing strips extend down along and are attached in or to the side wall joints.

2. A bag according to claim 1, in which the tube is of substantially square cross section.

3. A bag according to claim 1 or claim 2, in which the reinforcing strips also extend along the edges of the carrying loops.

4. A bag according to any one of the preceding claims, in which the reinforcing strips extend down along the side wall joints as far as the bottom wall.

5. A bag according to any one of the preceding claims, in which the reinforcing strips are wholly or partly constituted by separate strips.

6. A bag according to any one of claims 1 to 4, in which the reinforcing strips are integral extensions of the side and/or fold-forming walls.

7. A bag according to any one of the preceding claims, in which the top wall is provided in two parts connected to respective ones of the fold-forming walls.

8. A bag according to any one of the preceding claims, in which the folded down portion of each sid wall is also attached, at the attachment zone, to an adjacent edge of the top wall.

9. A bag according to claims 6,7 and 8, in which the two fold-forming walls are extended upwardly and these extensions ar each divided into edge strip portions and a central section, the central sections being folded down and attached along their edges to the attachment zones of the side walls so as to form two top wall halves, whereas the edge strip portions constitute the reinforcing strips.

10. A bag according to claim 9, in which the filling mouth is formed by the outer corners of extensions of the two top wall halves being cut out concavely and the middle concave extensions of the top wall halves being joined along the curved edges to form the filling mouth.

11. A bag according to any one of claims 1 to 9, in which the filling mouth is a separate unit attached around an aperture in the top wall.

12. A bag according to any one of the preceding claims, in which the joints between the walls are sewn or welded.

13. A bag according to any one of the preceding claims, in which the side walls and the fold-forming walls are constituted by two crossed webs of material which together provide a double-ply bottom wall of the bag, the lower ply of the bottom wall forming a bottom strap and the carrying loops being formed on the same web of material as the bottom strap.

14. A bag according to any one of claims 1 to 12, in which the side walls and the fold-forming walls are constituted by two crossed webs of material which together provide a double-ply bottom wall of the bag, the lower ply of the bottom wall forming a bottom strap and the fold-forming walls and the top wall being formed of the same web of material as the bottom strap.

15. A bag according to any one of the preceding claims, which is made of a two-layer plastics foil, one layer of which is woven and the other layer of which is constituted by a smooth foil.

16. A bag substantially as described with reference to any one of the examples illustrated in the accompanying drawings.

17. Cut out webs of material for the manufacture of a bag according to any one of the preceding claims, of which one of the webs of material forms in series a filling mouth half, a top wall half, a fold-forming wall, a bottom wall ply, a fold-forming wall, a top wall half and a filling mouth half, the web having concurrently with the top wall halves and the filling mouth halves edge strip for reinforcing the joints of the bag, while the other web of material forms in series a carrying loop, a side wall, a bottom wall ply, a side wall and a carrying loop.

18. Cut out webs of material according to claim 17, in which the one web provides, between one filling mouth half and the adjoining top wall half an oval cut out which wholly or partly separates the filling mouth half from the top wall half.

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